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(54) **Cushion**

(57) A cushion is disclosed which includes a flexible envelope 10 formed from an air-impermeable material containing a conformable filling, for example polystyrene beads 95. The cushion includes integral evacuation means 30, 50-90 for evacuating air from the cushion that the conformability thereof may be modified.

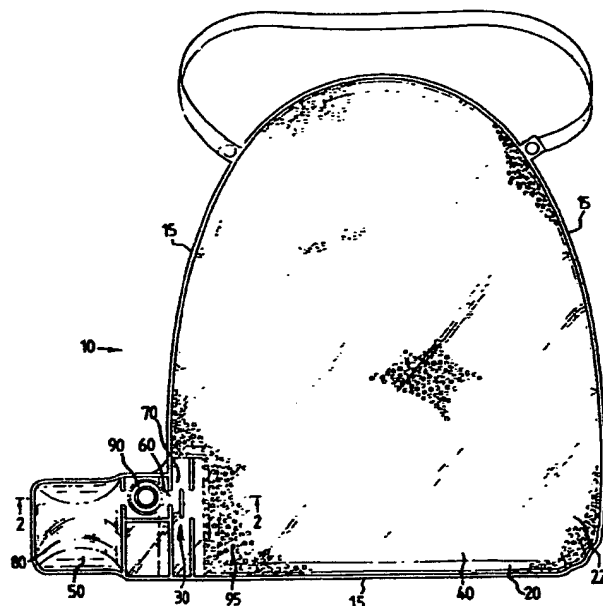
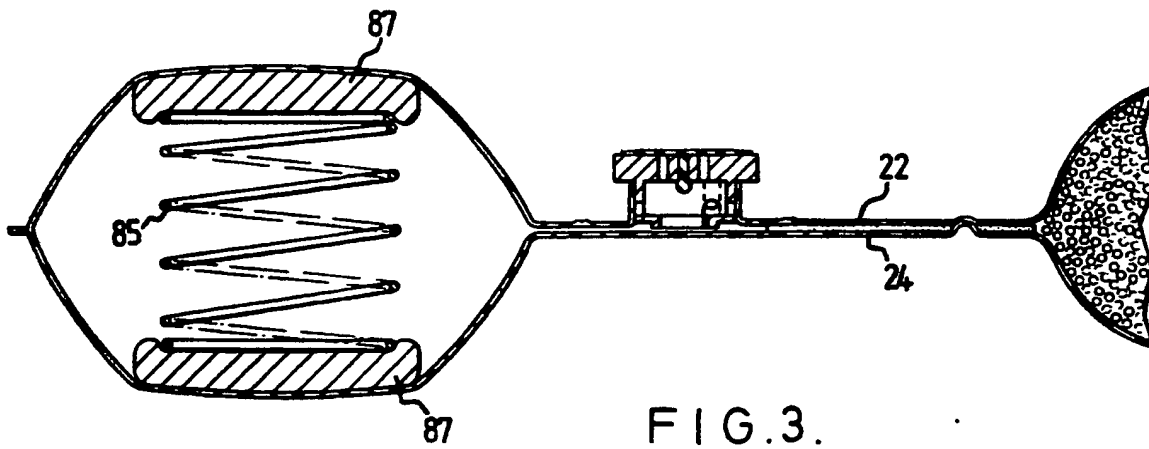
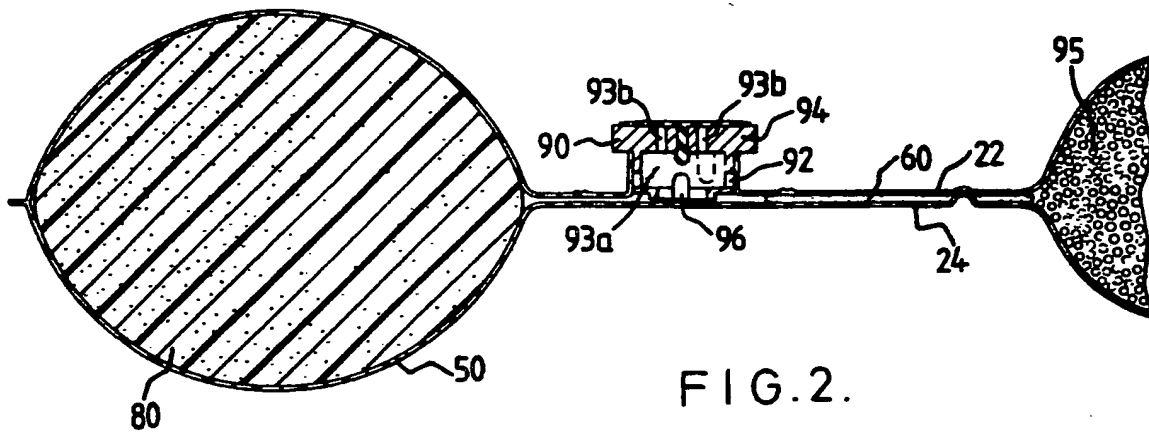


FIG.1

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CUSHION

This invention relates to a cushion such as a pillow, mattress or seating device. The term cushion as used throughout the specification means a support device which is capable in use of providing conformable support.

Cushions are known which include their filling, materials such as kapok, glass fibres, feathers, sponge, down, and expanded polystyrene beads or granules.

It is known to decrease the conformability of a cushion by evacuating air from within the cushion, but hitherto it has always been necessary to evacuate the air by means of an external pump.

According to the present invention there is provided a cushion which cushion comprises a conformable envelope of a substantially air-impermeable material and, within said envelope a conformable filling, said cushion further comprising integral evacuation means whereby air may be evacuated from said cushion thereby to modify the conformability of said cushion.

Any suitable means for evacuating air from the cushion may be employed, provided always of course that said means are integral with cushion. Preferably said means are small and unobtrusive so as to cause no discomfort to a user of the cushion, or are themselves flexible or deformable so as to cause no discomfort. In a preferred embodiment the evacuation means comprises a compartment having walls which are biased apart and having a one way valve communicating with the exterior of the cushion, which compartment can be collapsed e.g. under external pressure thereby to evacuate air from the compartment. The compartment may comprise all of the envelope of the cushion or may form a part thereof, e.g. by division of the envelope by means of one or more internal partitions. In the case of a compartmentalised envelope the respective compartments may be interconnected by air transfer ports e.g. in the nature of one way valves.

The envelope may be made of any suitable material such as for example a rubberised fabric or a plastics material such as polyvinyl chloride, nylon or polyethylene.

The filling is preferably expanded polystyrene beads, kapok, glass fibres, feathers, sponge or down, or a mixture of two or more of these materials. Most preferably there is employed e.g. 45.55% extruded

polystyrene heads, with 55-45% down feathers as disclosed in our co-pending Patent Application No. 8727717 (Publication No.).

Said means for biasing apart the walls of said compartment may comprise a spring such as a leaf spring or a coil spring or may be comprised e.g. by making the walls of the compartment of an elastic material and suitably shaping said walls e.g. in biconvex lenticular form. Alternatively the filling of the cushion or, if the compartment comprises part on the envelope, the controls of that part, may itself be of a resilient or elastic nature thus to bias apart the walls of said compartment, such as for example rubber or polymeric foam. Such a resilient or elastic filling may be a one-piece element or may be particulate or in the form of separate pieces.

An embodiment of a cushion according to the present invention will now be described by reference to the accompanying drawings, in which:

Fig. 1 is a plan view of an embodiment of a cushion (in the form of a pillow) according to the present invention;

Fig. 2 is a cross-section along the line 2-2 of

Fig. 1;

Fig. 3 is a cross sectional view similar to figure 2. of a second embodiment of the invention;

Referring to Figs 1 and 2 of the drawings there is shown a cushion 1 in the form of a pillow. The cushion 1 has an outer covering or integument 20 formed from two sheets 22, 24 of air-impermeable polyvinyl chloride ultrasonically edge-welded together. The cushion 10 is also divided laterally at 30 by ultrasonically welding sheets 22, 24 thus to form a pillow chamber 40 which contains a filling 95 in the form of expanded polystyrene granules of preferably 1mm dia. and a pump chamber 50 which is preferably of a size capable of being grasped in the hand of a user. The chambers 40 and 50 are in communication with each other, by means of an aperture or port 60 located at the division 30 of the cushion 10. An inefficient valve 70 comprised of a region of porous material such as synthetic foam is provided at the communication port 60.

The pump chamber 50 also includes another one way valve 90 whereby air within the pump chamber may be exhausted

to atmosphere. The porosity of the valve 70 is selected to be such that it has a resistance to air flow which is less than that of the one way valve 90 to atmosphere. For example the valve 70 may be 20% efficient in allowing air to pass through whilst the one way valve 90 may be 80% efficient in allowing air to pass through, thus a single collapsing of the pump chamber 50 will allow 80% of the air in the pump chamber 50 to be expelled into the atmosphere and 20% to be expelled into the pillow chamber 40. The subsequent restoration of the pump chamber 50 would take place slowly by sucking air from the pillow chamber 40 into the pump chamber 50 through the porous or foam material 70.

The pump chamber 5 has a filling 80 of sponge open cell or, resilient foam material for example polyurethane or polyether foam, which urges apart the walls of the chamber 50. The valve 90, as shown in figure 2 and comprises a sleeve 92 connected to sheet 22 with which a rotatable valve body 94 is engaged. The valve body 94 has a central bore 93a which communicates with pillow chamber 50 and valve 70 and a plurality of openings 93b to atmosphere, these openings being covered by a flexible plastics valve member 95 which allows air only to be expelled from the cushion.

The wall of the valve body 94 is provided with two opposed slots 96 (one shown) which, by rotation of the body 94 may be aligned with corresponding slots 98 (one shown) formed in the sleeve 92, so that air can be allowed to pass both ways through valve 90 (the slots 96, 98 are shown unaligned in figure 2 and aligned in figure 3).

To employ the cushion of the present invention the pillow chamber 40 is first made to conform to the desired shape e.g. to pillow the head of a user. Thereafter, the pump chamber 50 can be collapsed to exhaust air from the pump chamber 5 to atmosphere via one way valve 90. The foam 80 is then allowed to restore the internal volume of the pump chamber 50 and, in doing so will suck air from the pillow chamber into the pump chamber via valve 70. As air is removed from the pillow chamber 40 so the rigidity of the pillow chamber 4 will increase as the envelope 20 surrounding the pillow chamber 40 is collapsed onto the polystyrene filling. The process may be repeated as required to achieve any desired rigidity for the pillow chamber.

Referring now to Fig. 3 of the drawings this shows a modification of the cushion of Fig. 1 in which the sponge material is replaced by a spring 85. The spring 85 is in the form of a plastics or steel coil and

has end caps 87 against which pressure may be applied, by hand.

The valve 70 may take other forms, for example a one-way reed valve. If the valve 70 is fully efficient, a further valve or stopper, to allow air to be selectively introduced with the pillow chamber 40 may be provided, to allow the pillow to be reconfigured.

In the embodiments described separate chambers are disposed one of which is to form the cushion element and the other to form the pump element. In a simple embodiment it is envisaged that the present invention can comprise a single envelope containing a resilient open cell foam. The envelope can include a simple one way valve whereby pressure on the cushion will cause air to be exhausted from within the envelope to atmosphere through the one way valve, thus to alter the rigidity and conformability of the cushion.

The present invention provides a cushion whose rigidity or conformability can be readily altered and which is considerably simpler and cheaper to manufacture than have been prior art proposals.

The invention may be formed otherwise than as has been described and the invention includes within its scope

all such modifications and changes which would be
apparent to one skilled in the art.

CLAIMS

1. A cushion comprising a conformable envelope of a substantially air-impermeable material and, within said envelope a conformable filling, said cushion further comprising integral evacuation means whereby air may be evacuated from said cushion thereby to modify the conformability of the cushion.
2. A cushion as claimed in claim 1 wherein the evacuation means comprises a compartment having walls which are biased apart and a one way valve communicating with the exterior of the cushion.
3. A cushion as claimed in claim 1 wherein the envelope comprises first and second interconnected chambers, the first chamber containing the conformable filling and the second chamber including the evacuation means.
4. Apparatus as claimed in claim 3 wherein the evacuation means comprises a resilient or elastic material biasing the walls of the second chamber apart, contraction of the chamber causing air to be expelled therefrom.

5. Apparatus as claimed in claim 4 wherein expansion of the biasing means causes air to be withdrawn from the first chamber.

6. Apparatus as claimed in any one of claims 3 to 5 further comprising a valve disposed between the first and second chambers.

7. A cushion as claimed in claim 6 wherein the valve is inefficient.

8. A cushion as claimed in claim 7 wherein the valve is formed from a porous material.

9. Apparatus as claimed in claim 6 wherein the valve comprises a reed valve.

10. Apparatus as claimed in any one of claims 3 to 9 wherein the evacuation means further comprises a one-way valve for allowing expellation of air from the second chamber.

11. A cushion as claimed in claim 10 as dependent on claim 7 or claim 8 wherein the second valve has a resistance to airflow less than that of the inefficient valve.

12. A cushion as claimed in any one of the preceding claims wherein the envelope comprises first and second sheets of plastics material connected together.

13. Apparatus as claimed in claim 12 wherein the sheets are connected by welding.

14. A cushion as claimed in any one of the preceding claims wherein said conformable filling comprises polystyrene beads.

15. A cushion as claimed in any one of the preceding claims wherein the envelope is provided with a valve or stopper to allow air, when opened, to enter the envelope.

16. A cushion substantially as hereinbefore described with reference to figures 1 and 2 or 1 and 3 of the accompanying drawings.

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